REMARKS

This amendment submitted in response to the non-final Office Action dated January 8, 2007, is believed to be fully responsive to the points of rejection raised therein.

Claims 1, 5, 9, 13, 17 and 21 have been amended. Upon entry of the amendments, claims 1-24 will be pending in the present patent application. Applicant respectfully requests reconsideration and allowance of all pending claims in light of the above amendments and following remarks offered in response to the Office Action.

Rejections Under 35 U.S.C. 101

Claims 1-24 were rejected under 35 U.S.C. 101. Claims 1, 5, 9, 13, 17 and 21 are amended above. No new matter has been added, and support for the amendments can be found, for example, in paragraph [0016], lines 12-17 on page 6 and paragraphs [0045] and [0046] on pages 15 and 16 respectively, of the present application. Applicant respectfully submits that Claims 1-24 recite statutory subject matter. Thus, it is respectfully requested that the rejections of claims 1-24 under 35 U.S.C. 101 be withdrawn.

Rejections Under 35 U.S.C. 103

Claims 1-24 were rejected under 35 U.S.C 103(a) as being unpatentable over U.S Patent No. 5,018,069 (hereinafter "Pettigrew) in view of U.S Patent No. 5,727,128 (hereinafter "Morrison"). For a *prima facie* case of obviousness, the Examiner must set forth the differences in the claim over the applied reference, set forth the proposed modifications of the reference, which would be necessary to arrive at the claimed subject matter, and explain why the proposed modification would be obvious.

Applicants respectfully submit that the applied references, either alone or in combination, do not teach, disclose or suggest all the features recited in the independent claims 1, 5, 9, 13, 17 and 21. Specifically, none of the references teach, disclose or

suggest a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for comparing engine data from a plurality of engines against the engine baseline model, means for generating engine trends for each of the plurality of engines, means for identifying correlations between the engine trends and various parameters and means for calculating, for each identified correlation, summary statistics relating to the degree of correlation, wherein the model diagnostics component uses the summary statistics to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

In addition, none of the references teach, disclose or suggest a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for evaluating, a subset of the engines used to create the model in time order against the generated baseline, means for generating time-varying system trends, means for plotting data points representative of the time-varying system trends over time, means for fitting a smoothed curve to the plotted data points and means for computing residual errors for each point, wherein the model diagnostics component uses the residual errors to evaluate the performance of the engine baseline model, and whcrein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new enginc systems.

Accordingly, the combination of references cannot possibly include these features of the claims, and thus cannot render the claims obvious.

Claims 1, 9, 17 and claims depending therefrom

Pettigrew discloses a diagnostic system for continually monitoring and reporting data reflecting the performance condition of a monitored turbine engine. The diagnostic apparatus senses engine performance related parameters, refers the data to a standard atmosphere condition, and plots values relating to the functions of each engine performance related parameter with respect to other engine performance related parameters. (Abstract).

However, the diagnostic system disclosed in Pettigrew is not equivalent or even similar to a system and method for quantifying baseline model quality as disclosed in the present patent application. Furthermore, there is no disclosure, teaching or even a suggestion in Pettigrew to a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for comparing engine data from a plurality of engines against the engine baseline model, means for generating engine trends for each of the plurality of engines, means for identifying correlations between the engine trends and various parameters and means for calculating, for each identified correlation, summary statistics relating to the degree of correlation, wherein the model diagnostics component uses the summary statistics to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems, as recited in claims 1, 9 and 17. In particular, in the present patent application, generated engine trends are analyzed for the presence of correlations to various engine, aircraft, or environmental parameters. See, e.g., Application, paragraph [0050], lines 6-7 on page 18. For each correlation identified, summary statistics are calculated. See, e.g., Application, paragraph [0051], lines 15-16 on page 18. The summary statistics are then used to evaluate the relative goodness of the generated baseline models. See, e.g., Application, paragraph [0051], lines 1-2, on page 19.

Further, Applicants have carefully reviewed the material in Col. 2, lines 19-46, Col. 3, lines 10-20, Col. 3, lines 66-67, Col. 4, lines 1-4, Col. 3, lines 20-67, Figure 2 # 112 and Col. 4, lines 35-66, Figure 2 #120 and Figure 3, Col. 2, lines 64-66, Col. 11, lines 8-23 and Col. 5, lines 5-34, Table 1 and Col. 10, lines 5-9 referenced by the Examiner in Pettigrew, and submit that this material fails to disclose a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for comparing engine data from a plurality of engines against the engine baseline model, means for generating engine trends for each of the plurality of engines, means for identifying correlations between the engine trends and various parameters and means for calculating, for each identified correlation, summary statistics relating to the degree of correlation, wherein the model diagnostics component uses the summary statistics to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

Instead, the section (Col. 2, lines 19-46) discloses that engine behavior can be recorded in a referred engine diagnostic data (REDD) format and that a turbine engine may be diagnosed based on a logical analysis of the functional dependency between normal system operation and actual sensed engine performance parameters. Further, the section (Col. 3, lines 10-20) discloses a diagnostic analyzer that indicates the extent of performance degradation in a turbine engine by outputting REDD values, wherein the REDD values are a measure of the deviation between accepted engine parameter values representing the functional relationships between various turbine engine performance parameters and actual engine parameter curves. Further, the sections (Col. 3, lines 66-67, Col. 4, lines 1-4, Col. 3, lines 20-67, Figure 2 # 112 and Col. 4, lines 35-66, Figure 2 #120 and Figure 3, Col. 2, lines 64-66) disclose that the degree of engine degradation or deterioration is measured by a deviation between the actual, calculated performance function and the standard, stored performance baseline, and that the calculated REDD

values may be displayed to a pilot while in flight. In addition, the sections (Col. 11, lines 8-23, Col. 5, lines 5-34, Table 1 and Col. 10, lines 5-9) disclose that the engine performance parameters may be plotted as points on the baseline, and that the extent of deviation between the calculated performance function and the standard baseline is reflected in the REDD values, and further that the REDD values may be used by maintenance personnel to determine engine performance condition.

Clearly, there is no disclosure, teaching or even a suggestion in Pettigrew to a system and method for quantifying baseline model quality. Further, there is no disclosure, teaching or even a suggestion in Pettigrew to a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for comparing engine data from a plurality of engines against the engine baseline model, means for generating engine trends for each of the plurality of engines, means for identifying correlations between the engine trends and various parameters and means for calculating, for each identified correlation, summary statistics relating to the degree of correlation, wherein the model diagnostics component uses the summary statistics to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

One skilled in the art would therefore conclude that Pettigrew appears only to disclose a technique for determining the *extent of engine deterioration* by measuring the degree of deviation between various turbine engine performance parameters and actual engine parameter curves. In contrast, the present patent application discloses a system and method for *quantifying baseline model quality* and *evaluating the performance of an engine baseline model* by analyzing generated engine trends for the presence of correlations to various engine, aircraft, or environmental parameters. Specifically, in the present patent application, the quality of the generated baseline model is determined by identifying correlations between engine trends and various parameters, and for each

identified correlation, calculating summary statistics relating to the degree of correlation, wherein the summary statistics of the correlations are used to evaluate the relative goodness of the generated baseline models.

Morrison similarly fails to teach this recited feature, and indeed, the Examiner did not rely upon Morrison for teaching a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for comparing engine data from a plurality of engines against the engine baseline model, means for generating engine trends for each of the plurality of engines, means for identifying correlations between the engine trends and various parameters and means for calculating, for each identified correlation, summary statistics relating to the degree of correlation, wherein the model diagnostics component uses the summary statistics to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

Consequently, no combination of the references could render such inventive features obvious. In view of the above-noted distinctions, Applicant submits that claims 1, 9 and 17 are neither the same as, nor in any way taught or suggested by Pettigrew or Morrison taken either singly or in combination. In view of the foregoing deficiencies in the teachings of the prior art, the references cannot establish a *prima facie* case of obviousness of claims 1, 9 and 17. Accordingly, these claims are believed to bc clearly patentable over the cited combination. Their reconsideration and allowance is respectfully requested. Dependent claims 2-4, 10-12 and 18-20 depend from presumably allowable independent claims 1, 9 and 17. Accordingly, these claims are believed to be clearly patentable over the cited combination. Their reconsideration and allowance is requested.

Claims 5, 13, 21 and claims depending therefrom

As summarized above, the diagnostic system disclosed in Pettigrew is not equivalent or even similar to a system and method for quantifying baseline model quality as disclosed in the present patent application. Furthermore, there is no disclosure, teaching or even a suggestion in Pettigrew to a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for evaluating, a subset of the engines used to create the model in time order against the generated baseline, means for generating time-varying system trends, means for plotting data points representative of the time-varying system trends over time, means for fitting a smoothed curve to the plotted data points and means for computing residual errors for each point, wherein the model diagnostics component uses the residual errors to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

Morrison discloses a process modeling system and method that develops a set of process model inputs for a process model, such as a neural network, for a number of process input variables and process output variables. (Abstract)

The Morrison reference has been reviewed with respect to the 35 U.S.C 103(a) rejection and fails to obviate the deficiencies of Pettigrew in regards to a system and method for quantifying baseline model quality as disclosed in the present patent application. Furthermore, there is no disclosure, teaching or even a suggestion in Morrison to a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for evaluating, a subset of the engines used to create the model in time order against the generated baseline, means for generating time-varying system trends, means for plotting data points representative of the time-varying system trends over time, means for fitting a smoothed curve to the plotted data points and means for computing residual errors for each point, wherein the model diagnostics component uses the residual errors to evaluatc the performance of the

engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

Applicants have carefully reviewed the material in Figure 2 #120 and Col. 4, lines 44-49 referenced by the Examiner in Pettigrew and Col. 4, lines 22-29 and Col. 8, lines 11-31 referenced by the Examiner in Morrison and submit that this material fails to disclose a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model, wherein the model diagnostics component includes means for evaluating, a subset of the engines used to create the model in time order against the generated baseline, means for generating time-varying system trends, means for plotting data points representative of the time-varying system trends over time, means for fitting a smoothed curve to the plotted data points and means for computing residual errors for each point, wherein the model diagnostics component uses the residual errors to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

Instead, the section (Figure 2 #120 and Col. 4, lines 44-49) in Pettigrew discloses a printer to enable a pilot to make a permanent paper record of sensed and calculated values and a means for displaying the selected parameters and calculated values. Further, the section (Col. 4, lines 22-29) in Morrison discloses the use of a linear mathematical tool to determine residual errors and the section (and Col. 8, lines 11-31) in Morrison discloses the number of measurements or values that may be included in sub-files within one or more batch files.

Clearly, there is no disclosure, teaching or even a suggestion in either Pettigrew or Morrison to a system and method for quantifying baseline model quality, comprising a model diagnostics component to evaluate the performance of an engine baseline model,

wherein the model diagnostics component includes means for evaluating, a subset of the engines used to create the model in time order against the generated baseline, means for generating time-varying system trends, means for plotting data points representative of the time-varying system trends over time, means for fitting a smoothed curve to the plotted data points and means for computing residual errors for each point, wherein the model diagnostics component uses the residual errors to evaluate the performance of the engine baseline model, and wherein the system is configured to use the engine baseline model to perform at least one of monitoring engine status, predicting future engine behavior, diagnosing engine faults, determining engine performance, determining engine quality and designing new engine systems.

One skilled in the art would therefore conclude that Morrison appears only to disclose a technique for developing a process model from a set of process input variables and process output variables. In addition, and as mentioned above, Pettigrew appears only to disclose a technique for determining the extent of engine deterioration by measuring the degree of deviation between various turbine engine performance parameters and actual engine parameter curves. In contrast, the present patent application discloses a system and method for *quantifying baseline model quality* and *evaluating the performance of an engine baseline model.* Specifically, in the present patent application, data points representative of engine trends are generated and plotted over time. Residual errors are then computed for each trend point and used to evaluate the performance of the engine baseline model. See, e.g., Application, paragraphs [0053] and [0054].

Consequently, no combination of the references could render such inventive features obvious. In view of the above-noted distinctions, Applicant submits that claims 5, 13 and 21 are neither the same as, nor in any way taught or suggested by Pettigrew or Morrison taken either singly or in combination. In view of the foregoing deficiencies in the teachings of the prior art, the references cannot establish a *prima facie* case of obviousness of claims 5, 13 and 21. Accordingly, these claims are believed to be clearly patentable over the cited combination. Their reconsideration and allowance is respectfully requested. Dependent claims 6-8, 14-16 and 22-24 depend from presumably

allowable independent claims 5, 13 and 21. Accordingly, these claims are believed to be clearly patentable over the cited combination. Their reconsideration and allowance is requested.

In view of the remarks and amendments set forth above, Applicant respectfully requests allowance of the pending claims.

Please charge all applicable fees associated with the submittal of this Amendment and any other fees applicable to this application to the Assignee's Deposit Account No. 07-0868.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number below.

Respectfully submitted,

/Penny A. Clarke/
Penny A. Clarke
Reg. No. 46, 627

General Electric Company
Building K1, Room 3A72
Niskayuna, New York 12309
March 26, 2007
Telephone: (518) 387-5349